



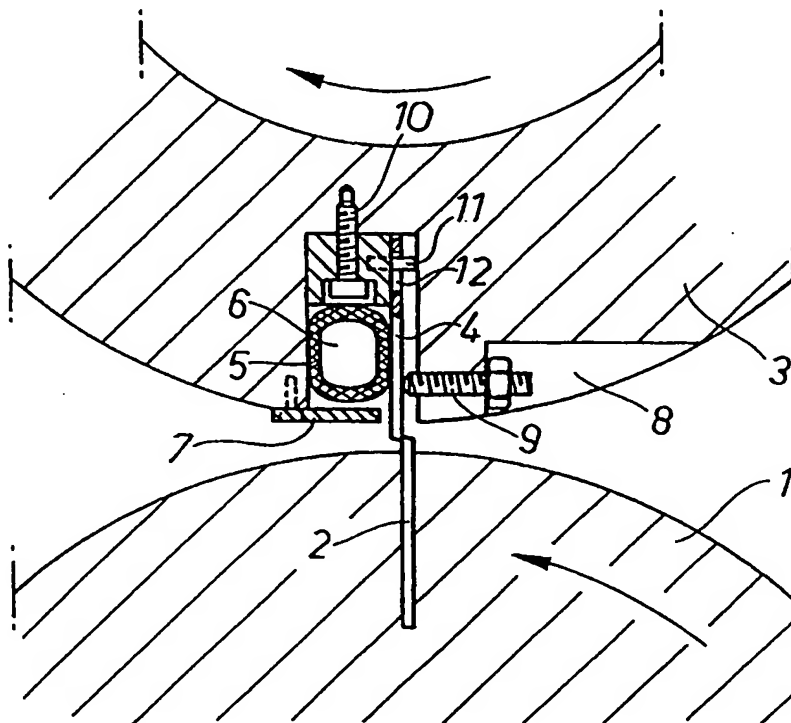
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B26D 1/40	A1	(11) International Publication Number: WO 99/58306 (43) International Publication Date: 18 November 1999 (18.11.99)
(21) International Application Number: PCT/FI99/00327 (22) International Filing Date: 22 April 1999 (22.04.99) (30) Priority Data: 981036 11 May 1998 (11.05.98) FI (71) Applicant (for all designated States except US): VALMET CORPORATION [FI/FI]; Fabianinkatu 9A, FIN-00130 Helsinki (FI). (72) Inventor; and (75) Inventor/Applicant (for US only): KARHU, Martti [FI/FI]; Niveräkatu 2, FIN-48770 Karhula (FI). (74) Agents: KUJALA, Harri et al.; Leitzinger Oy, Ruoholahdenkatu 8, FIN-00180 Helsinki (FI).		(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: ADJUSTING MECHANISM FOR A BLADE CLEARANCE IN A TWIN ROTARY CUTTER

(57) Abstract

The invention relates to an adjusting mechanism for a blade clearance in a twin rotary cutter, a web to be cut in said cutter being guided through between two rotating rolls (1, 3), one of which is provided with a solid blade (2) and the other roll with an adjustable cutter blade (4). The adjustable blade is provided with a press element (5) for subjecting the blade to a force controlling its position. The invention relates also to a method for adjusting the above-mentioned blade clearance. In this method, the adjustable blade is subjected to a force regulating the blade position. The invention relates further to a twin rotary cutter for cross-cutting a web-like material (4), such as a pulp web, said cutter making use of the above-described mechanism and method.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Larvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BI	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

Adjusting mechanism for a blade clearance in a twin rotary cutter

The present invention relates to an adjusting mechanism for a blade clearance in a twin rotary cutter, a web to be cut in said cutter being guided through between two rotating rolls, one of which is provided with a solid blade and the other roll with an adjustable cutter blade.

In the prior art cross-cutting mechanisms used in a pulp-drying machine, the cutting process is based on a rotating cross-cutting blade and a solid counter-blade. The aim is to provide a good cutting trace. Requirements for a good cutting trace include permanently sharp blades and a controlled blade clearance. As the machines become wider and wider, the control of a blade clearance will be increasingly difficult, if not impossible. In any event, the technical solution will be extremely expensive in the present-day mechanisms which involve a rotating cutting blade and a counter-blade. At the cutting point, the pulp web is subjected to compression between the blades before the web is cut. In such a cutting process, the edge areas of a sheet develop a pulp material compression at the edges and material build-ups ("fish eyes"). In terms of the further processing of a pulp sheet, such material build-ups are not desirable, while the cutting trace itself need not be particularly good since, after all, the cut pulp sheet will be processed further.

An object of the invention is to eliminate such a foregoing clearance of the cutting blades, which impedes a web cutting process. A mechanism of the invention is characterized in that the adjustable blade is provided with a press element for subjecting the blade to a force controlling its position.

In order to facilitate the practical operation, the press element has a compression force which can be regulated, said press element comprising, in a preferred case, a hydraulically or pneumatically loaded elastic bellows or tube.

A mechanism of the invention offers the following benefits over a mechanical blade suspension:

- pressure compensates for blade wear
- "run without a web" - condition = pressure off, consequently no wearing of blades

5 The invention relates also to a method for adjusting a blade clearance in a twin rotary cutter, said method being characterized in that an adjustable blade is subjected to a force controlling the blade position.

10 In a preferred case, this adjustment is effected in such a way that the pressure of a pressure medium to be fed into an elastic press element in contact with an adjustable blade is regulated for achieving a desired position for the blade element and for eliminating a developed clearance. In practice, the press element is fitted with a pneumatic or hydraulic source of pressure, which uses a control unit and a supply valve for regulating the level of pressure to be fed into
15 the press element.

The pressure medium can be a gas or a fluid.

20 The invention will be described in more detail with reference made to the accompanying drawings.

Fig. 1 shows a solution of the invention in principle,

25 fig. 2 shows a cutting blade with its fastening holes,

fig. 3 shows an adjustment system for a blade of the invention with its control unit, and

30 fig. 4 shows the system of fig. 3, but manually implemented.

Fig. 1 shows two rolls 1 and 3, the lower being provided with a solid counter-blade 2 extending from the outer roll surface. The upper or overhead roll 3 is provided with a blade 4, which is in cooperation with the counter-blade 2 and has its position adjustable in accordance with the invention. Naturally, the

adjustable blade 4 can be optionally mounted on the lower roll 1 and the solid blade 2 on the upper roll 3.

5 The blade 4 is fitted in a recess included in the outer surface of the roll 3, the blade 4 being secured in said recess by means of a fastening bolt 10 with the help of an attachment mounted on the roll. The attachment is provided with a fastening peg 11 projecting into the recess for attachment apertures 12 present in the blade 4. The blade 4 can be provided with one or more apertures. In the embodiment shown in fig. 2, the apertures are elongated in shape for an easier
10 attachment of the blade.

Between the attachment and the outer periphery remains an interspace, in which is accommodated a tube-like bellows 5 that is elastic and substantially fills the available space within the recess. The blade 4 positions itself along the
15 other side of the recess with a slight leeway and projects from the outer surface of the roll 3. The blades 2 and 4 have such a dimensioning that, at a point of cutting, the blades will meet each other in the illustrated fashion for cutting a web. The recess is partially closed by a plate 7 restricting the movement of the blade.

20 As shown in figs. 3 and 4, the press element, an elastic tube 5 in the case of fig. 1, is connected with a source of pressure 13, which can be hydraulic or pneumatic. The pressure source has its feeding line fitted with a valve 15, which in turn is in communication with a control unit 14. This control unit 14
25 receives its set values from a detector 16, which is mounted on a conveyor and may respond to possible breaks or other malfunctions.

The roll 3 is machined to include a cut-out 8, which is provided with an adjusting screw 9 extending all the way to the blade 4 for effecting a rough adjust-
30 ment of the blade 4.

The actual adjustment of clearance is carried out by supplying the elastic bellows 5 with a pressure medium, which can be a gas, e.g. air, or a hydraulic fluid. The expanding bellows 5 presses against the blade 4 and forces the

same towards the recess wall. Thus, a possible clearance between the blades can be adjusted.

Alternatively, of course, it is possible to discharge a pressure medium from the
5 bellows for effecting a blade adjustment in the other direction.

The apparatus and method of the invention can be used for eliminating possible disturbance factors in cutting, which result from vibrations and deflections of the rolls. In cardboard cutters, for example, the foregoing aspects have been
10 limiting factors in terms of increasing the operating width. At the same time, wearing of the blades can be compensated for and, by virtue of a simple structure, the mass of rolls can be reduced and, thus, the deflection of rolls will be reduced as well.

15

Claims

1. An adjusting mechanism for a blade clearance in a twin rotary cutter, a web to be cut in said cutter being guided through between two rotating rolls (1, 3),
5 one of which is provided with a solid blade (2) and the other roll with an adjustable cutter blade (4), characterized in that the adjustable blade is provided with a press element (5) for subjecting the blade to a force controlling its position.
2. An adjusting mechanism as set forth in claim 1, characterized in that the
10 press element (5) has a compression force which can be regulated.
3. An adjusting mechanism as set forth in claim 1, characterized in that the
press element (5) comprises a hydraulically or pneumatically chargeable elastic
bellows or tube.
15
4. An adjusting mechanism as set forth in claim 1, characterized in that the twin
rotary cutter is included in the sheet cutting unit of a pulp-drying machine.
5. An adjusting mechanism as set forth in claim 1, characterized in that the
20 blade (4) is provided with elongated attachment holes (12).
6. An adjusting mechanism as set forth in claim 2, characterized in that the
mechanism comprises an extra-cutter source (13) and regulating assembly
(14, 15) for compression force.
25
7. A method for adjusting a blade clearance in a twin rotary cutter, characterized in that an adjustable blade is subjected to a force regulating the blade position.
8. A method as set forth in claim 7, characterized in that the regulation of pressure is used for compensating for the wearing of blades (2, 4).
30
9. A twin rotary cutter for cross-cutting a web-like material (4), such as a pulp web, comprising two rotatable rolls (1, 3) or the like, the web (4) to be cut being

guided therethrough, and one of which is provided with a fixedly mounted blade (2) and the other with an adjustable cutter blade (4), characterized in that the adjustable blade (4) is secured to a second roll (3) or the like by means of a press element (5), having a blade-position regulating force which can be
5 set/adjusted while the cutter is running.

10. A twin rotary cutter as set forth in claim 9, characterized in that the press element comprises

- a hydraulically and/or pneumatically chargeable bellows (5) or tube or a
10 plurality of bellows or tubes
- means (13-15) in a functional communication with the cutter for setting a hydraulic and/or pneumatic force.

11. A twin rotary cutter as set forth in claim 10, characterized in that the means
15 (13-15) in a functional communication with the cutter for setting a hydraulic and/or pneumatic force include at least one pressure adjusting valve (15).

12. A twin rotary cutter as set forth in claim 10, characterized in that the press elements include a control assembly (14) which, after receiving information
20 about a web break (16), is able to release a hydraulic and/or pneumatic force with the press element.

1/2

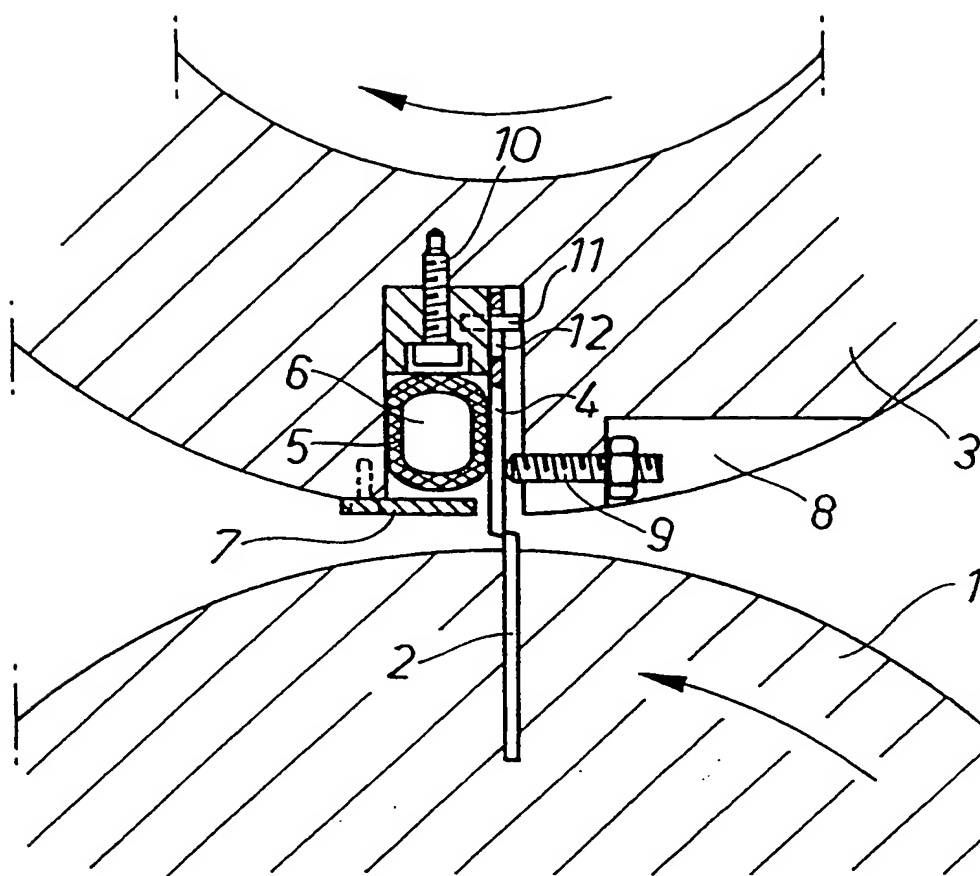


Fig. 1

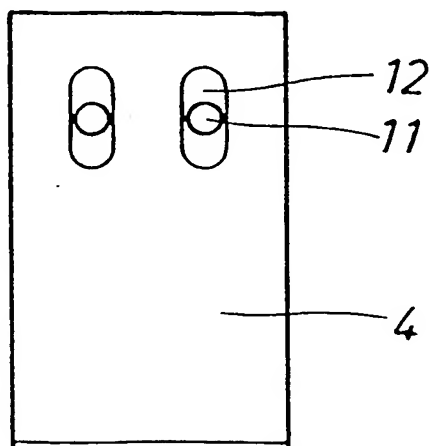
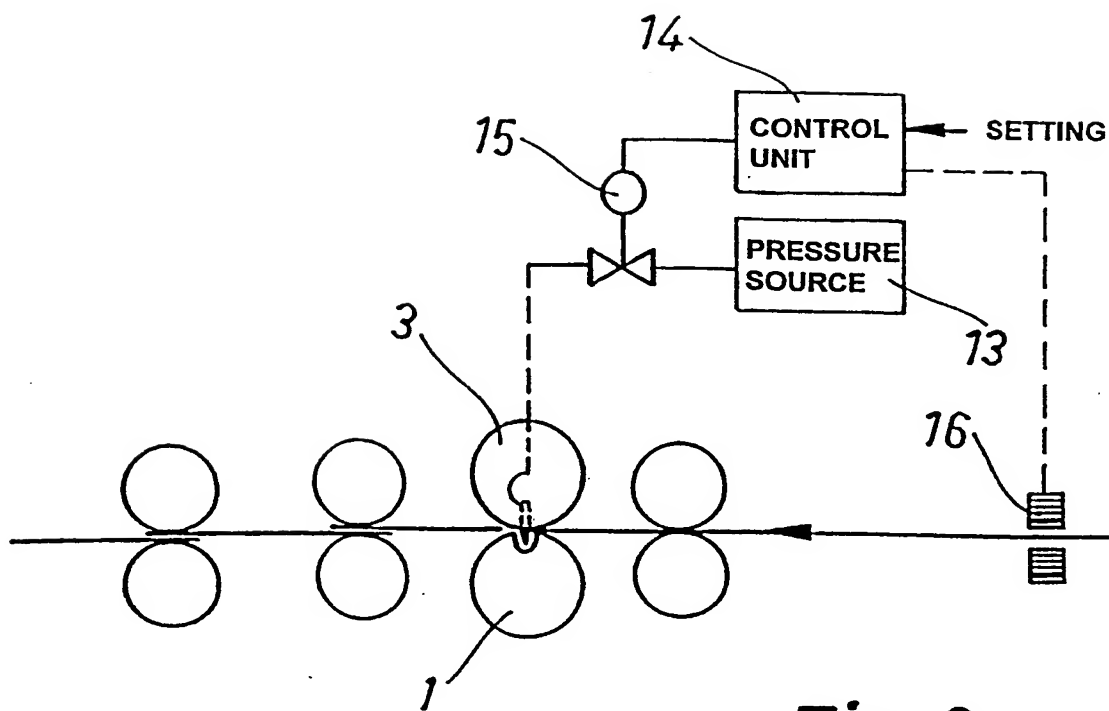
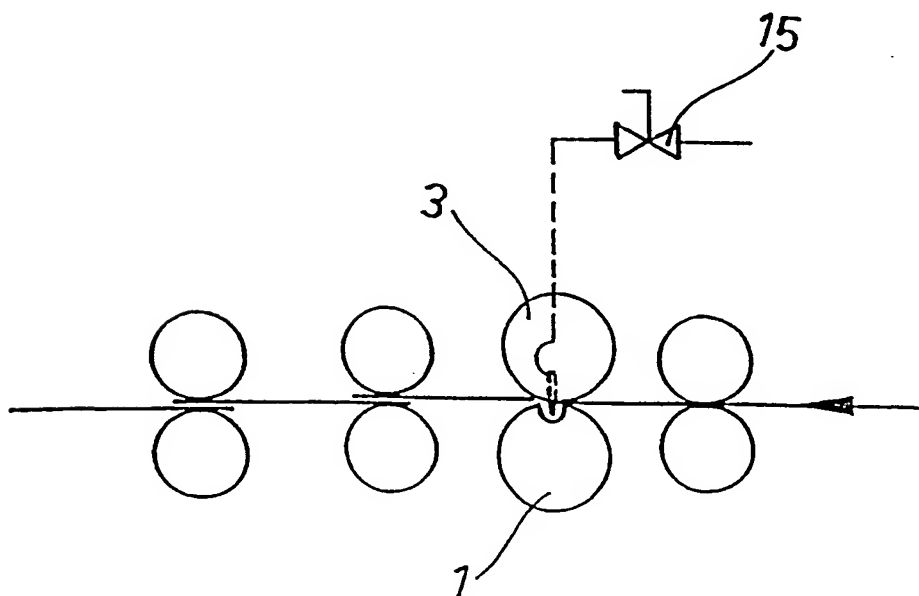


Fig. 2

2/2

**Fig. 3****Fig. 4**

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/00327

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B26D 1/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B26D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPIL, EDOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 3928594 A1 (VALMET-STRECKER GMBH), 7 March 1991 (07.03.91), column 2, line 12 - column 3, line 27, abstract --	1-12
X	DE 2021061 A (DR. OTTO C. STRECKER KG), 11 November 1971 (11.11.71), page 1, line 19 - page 2, line 13; page 3, line 35 - page 4, line 8, figures 2,3 --	1-12
A	SE 469940 B (SVEN ARNE ROLAND STRÖMBERG), 11 October 1993 (11.10.93) --	1-12

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

13-August-1999

Date of mailing of the international search report

16-08-1999

Name and mailing address of the ISA

Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Johnny Claesson
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/00327

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SE 469217 B (SVEN ARNE ROLAND STRÖMBERG), 7 June 1993 (07.06.93), page 3, line 23 - page 4, line 18 --	1-12
A	DE 3507929 A1 (MASCHINENFABRIK GOEBEL GMBH), 11 Sept 1986 (11.09.86) --	1-12
A	DE 2128871 A (FA. E. C. H. WILL), 21 December 1972 (21.12.72), figure 4 --	1-12
A	FI 101352 B (OY GMA PRINTING SYSTEMS AB), 29 June 1996 (29.06.96) -- -----	1-12

INTERNATIONAL SEARCH REPORT
Information on patent family members

01/07/99

International application No.
PCT/FI 99/00327

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3928594 A1	07/03/91	EP 0415116 A JP 3092290 A	06/03/91 17/04/91
DE 2021061 A	11/11/71	FR 2090807 A GB 1285675 A JP 52014472 B NL 7105168 A	14/01/72 16/08/72 21/04/77 02/11/71
SE 469940 B	11/10/93	AT 146441 T DE 69219111 D,T DE 69306599 D,T EP 0551812 A,B EP 0572498 A,B ES 2097935 T JP 6210591 A JP 6507953 T SE 9200101 A US 5357836 A US 5809773 A	15/01/97 16/10/97 28/05/97 21/07/93 08/12/93 16/04/97 02/08/94 08/09/94 15/07/93 25/10/94 22/09/98
SE 469217 B	07/06/93	SE 9103477 D	00/00/00
DE 3507929 A1	11/09/86	CA 1272441 A EP 0196688 A,B JP 1038636 B JP 1552160 C JP 61209896 A US 4671154 A	07/08/90 08/10/86 15/08/89 23/03/90 18/09/86 09/06/87
DE 2128871 A	21/12/72	NONE	
FI 101352 B	29/06/96	EP 0800444 A FI 946114 A WO 9620072 A	15/10/97 29/06/96 04/07/96

THIS PAGE BLANK (USPTO)